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Predicting Patient Satisfaction Levels Using Artificial Intelligence Technology for Food Service at ERI Soedewo RSPAD Gatot Soebroto

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Abstract

Satisfaction is one aspect that assesses the quality of health services, namely in serving food in hospitals. The purpose of this study was to describe the level of patient satisfaction with food at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital. The results of a study of 47 patients in the Eri Soedewo Pavilion in June 2021 showed that the remaining food of patients who consumed ≤ 20%, 35 patients were categorized as good, while 12 patients had the remaining food consumed ≥ 20%, which was classified as not good. Therefore, researchers are interested in conducting this research. Methods: The type of research used is observational with a cross-sectional design. Samples were taken using purposive sampling with inclusion criteria: male and female inpatients aged ≥18 years admitted for at least two days, patients who received oral food from the hospital, were not illiterate and could communicate, had signed the PSP form and were willing as research samples. The model in this study was 47 patients taken in June 2021. Results: Based on the sample size calculation, 47 people were determined. The results of the level of patient satisfaction at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, found that the performance of food serving has not met the minimum standard set, namely 90%. With a higher percentage of reality, namely with an average of 82.0%, the average expectation percentage is 76.7%. However, suppose the real results are compared with patient expectations. In that case, the result is that the patient is satisfied with the services provided. Artificial intelligence can assess medical data, food preferences, and patient feedback to improve food serving performance.

Keywords: Satisfaction Level, Food Service, Inpatients, Artificial Intelligence

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1. Introduction

According to WHO (World Health Organization), a hospital is a social organization that provides comprehensive services, cures diseases and prevents infections in the community [1]. Hospitals are also training centers for health workers and medical research centers [2].

According to Ahmad, this is one of the reasons why the quality of hospital services is very important to improve medical support services, namely hospital food services, one of which is food presentation [3]. Oriented to patient satisfaction is an important component in the success of serving food in hospitals [4]. The level of satisfaction with serving food in the hospital can be seen from product expectations or a person's perception of the quality of food and officer service to patients [5]. Measuring the level of patient satisfaction is a very important quality indicator to determine the quality of service in the hospital [6].

Based on the Decree of the Minister of Health of the Republic of Indonesia Number: 129 / Menkes / SK / II / 2008 concerning Minimum Hospital Service Standards, the standard level of patient satisfaction with food serving is ≥ 90% [7]. The story of patient satisfaction with food serving at Sanglah General Hospital states that the level of patient satisfaction with food serving is 79.83% and is still below the standard level of satisfaction (90%) [8]. This study explains the quality of food serving services that determine patient satisfaction. The relationship between the level of satisfaction of a low salt diet with the rest of the patient's food at Klungkung Hospital based on the percentage results of 79.11% which means that the level of patient satisfaction in this category is not satisfactory because it has not reached the standard level of joy which is (90%) [9].

According to Anggraini, regarding the level of patient satisfaction with food presentation at the Condong Catur Yogyakarta hospital, it is said that patients are not satisfied with the food presentation provided, seeing the average expected value, which is greater than the reality, namely 3.48> 3.29 [10]. The satisfaction level is low at food temperature, serving tools, serving time, and waiter friendliness [11].

Using AI, a hospital or healthcare facility can analyze patient data, such as dietary preferences, food allergies, or certain medical conditions, to compile menus tailored to individual needs [12]. AI can help ensure that the food served matches the patient's needs, increasing their satisfaction with the dining experience [13]. AI can combine patient data and preferences to provide food recommendations that match their needs and preferences [14]. The system can help patients find food options that suit them, increasing their satisfaction with the choices available [15]. AI can be used to collect and analyze feedback from patients about the food served [16]. By analyzing this data, a hospital or healthcare facility can better understand patient preferences and needs and make necessary adjustments in food presentation to improve patient satisfaction levels in the future [17].

2. Research Method

The type of research used is observational, with a cross-sectional research design, namely the independent variable and the dependent variable are taken data at the same time; this research was conducted at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, which is located at Jl. Abdulrahman Saleh No. 24 Senen, Central Jakarta. The research time was born in June 2021. The sample in this study was 47 patients who were taken during June 2021. The inclusion criteria in this study are a. Male and female inpatients aged ≥18 years admitted to the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, b. Patients get food per oral from the hospital, c. Not illiterate and able to communicate well, d. Have signed the PSP form and are willing to be a patient. Have signed the PSP form and are ready to be research samples, e. Patients who have been treated for at least two days, while the exclusion criteria in sampling are those with a low salt diet. How to Collect Data, In this study, in the form of sample identity, patient expectations and reality were collected by interviewing and filling out a questionnaire.

3. Findings

3.1 Respondent Characteristics

a. Sample gender
   Based on the gender of the sample, of the 47 samples studied, there were 19 samples with male gender (40.4%) and 28 with female gender (59.6%). The distribution of models based on gender can be seen in Table 1.
b. Sample Age
   Based on the sample's age range, the model's age is divided into five categories, namely 16-18 years, 19-29 years, 30-49 years, 50-64 years and 65-80 years. Of the 47 samples, 20 (42.6%) were aged 30-49. The distribution of models based on age can be seen in Table 1.
c. Sample Education
   Of the 47 samples studied, the sample education level was mostly high school graduates, with as many as 16 people (34%). The distribution of sample education levels can be seen in Table 1.
d. Sample Occupation
   Of the 47 samples studied, 17 worked as private employees (36.2%), 14 (29.8%) did not work, and the rest were traders, civil servants, and others. The distribution of sample occupations can be seen in Table 1.
e. Treatment Class
   Based on the results of the study, the largest sample based on treatment class was class II with as many as 18 people, followed by class III and class I. The distribution of sample treatment classes is in Table 1.
f. Type of Disease
   The type of disease in this study was dominated by plastic surgery, namely 21 people (44.7%) and the lowest was ob-gyn, as many as one person (2.1%). The distribution of sample disease types is in Table 1.

Table 1. Frequency Distribution of Respondent Characteristics based on Gender, Age, Education Level, Ward Class, and Disease Type in Paviliun Eri Soedewo RSPAD Gatot Soebroto.

CHARACTERISTICS OF RESPONDENTS		
CHARACTERISTICS	TOTAL	
	N	%
GENDER TYPE		
MALES	19	40,4
WOMEN	28	59,6
TOTAL	47	100
AGE		
16 - 18	2	4,3
19 - 29	10	21,3
30 - 49	20	42,6
50 - 64	11	23,4
65 - 80	4	8,5
TOTAL	47	100

EDUCATION LEVEL		
ELEMENTARY SCHOOL GRADUATION	6	12,8
JUNIOR HIGH SCHOOL GRADUATION	9	19,1
HIGH SCHOOL GRADUATION	16	34
DIPLOMA/ACADEMIC	6	12,8
COLLEGE	10	21,3
TOTAL	47	100
JOB		
NOT WORKING	14	29,8
CIVIL SERVANTS	6	12,8
PRIVATE EMPLOYEE	17	36,2
TRADE/SELF-EMPLOYED	8	17
OTHER	2	4,3
TOTAL	47	100
MAINTENANCE CLASS		
CLASS I	14	29,8
CLASS II	18	38,3
CLASS III	15	31,9
TOTAL	47	100
DISEASE TYPE		
INTERNA	5	10,6
NEURO	8	17
ORTHO	12	25,5
PLASTIC SURGERY	21	44,7
OBGYN	1	2,1
TOTAL	47	100

3.2 Respondents' Expectations of Food Presentation

Respondents' expectations of food presentation at the Eri Soedewo Pavilion of Gatot Soebroto Army Hospital indicate patient satisfaction with the quality of food presentation. An analysis was conducted to see the tendency of respondents to patient expectations in 25 aspects. Inpatient expectations tend to be important answers as much as 65.4%, meaningful solutions as much as 23.6%, and very important answers 9.7% less important as much as 1.4%. The distribution of sample expectations can be seen in Appendix 3. After data processing, the highest patient expectation ranking was determined to be the top 5 based on the patient expectation score on each aspect, including:

a. As many as (82.1%) Waiters apply a smile, greeting, greeting in serving the food.
b. As many as (82.1%) Nutritionists apply the smile, greeting, greeting in serving their meals.
c. As many as (82.1%) of nutritionists introduce themselves before providing nutrition services.
d. (80.9%) The waiter knocks on the door, says greetings, and identifies the patient before serving the food.

e. (80.4%) The cutlery used is clean.

3.3 Patient Reality on Food Presentation

Patient reality can be used as a benchmark to determine service performance in serving food. Of the 25 aspects studied from the patient's reality towards menu presentation at Gatot Soebroto Army Hospital, 68.7% of the sample chose good, 20.7% chose very well, 10.4% chose quite good, and 0.3% chose less good. To determine the best performance of the 25 aspects studied, the reality scores are sorted based on the top 5 rankings, as follows:

a. A total of (87.7%) of servers apply smiles, greetings, and greetings in serving their food.
b. As many as (87.7%) of nutritionists apply smiles, greetings, and greetings to provide nutrition services.
c. A total of (87.7%) of servers knocked on the door, said greetings and confirmed the patient's identity before serving food.
d. (87.2%) Dietitians introduce themselves before providing services to patients.
e. As many as (86.4%) Waiters invite patients to eat

Prediction of Patient Satisfaction Level by Using Artificial Intelligence Technology on Food Serving ERI Soedewo Gatot Soebroto Army Hospital is made by comparing the percentage of reality with the rate of expectations. Patient satisfaction with food presentation can be seen in the results in Table 2.

Table 2. Patient Satisfaction Level Regarding Food Presentation at Eri Soedewo Pavilion, Gatot Soebroto Army Hospital

No	STATEMENT	% EXPECTATION	% REALITY	SATISFACTION LEVEL
1	The taste of the food served is delicious	78.3	78.3	SATISFIED
2	The types of ingredients used are diverse	73.2	78.3	SATISFIED
3	The colors of the food served are varied	75.3	77.9	SATISFIED
4	The aroma of the food served enhances the appetite	75.3	77.4	SATISFIED
5	The texture of the food served is appropriate for the type of ingredients	74.0	81.3	SATISFIED
6	The portion of the food served is suitable for the individual's needs	74.5	78.7	SATISFIED
7	The serving utensils used are appropriate for the type of ingredients and preparation	69.4	80.4	SATISFIED
8	The eating utensils used are clean	80.4	84.3	SATISFIED
9	The necessary eating utensils are provided in full	73.6	77.9	SATISFIED
10	The waitstaff has a clean, tidy, and polite appearance	79.1	85.1	SATISFIED
11	The nutritionists have a clean, tidy, and polite appearance	79.1	85.5	SATISFIED
12	The waitstaff applies the smile, greet, greet in serving the food	82.1	87.7	SATISFIED
13	The nutritionists apply the smile, greet, greet in providing nutrition services	82.1	87.7	SATISFIED

14	The waitstaff knocks on the door, greets, and verifies the patient's identity before serving the food	80.9	87.7	SATISFIED
15	The waitstaff politely invites the patient to start eating	76.2	86.4	SATISFIED
16	The nutritionists introduce themselves before providing nutrition services	82.1	87.2	SATISFIED
17	The nutritionists advise the patients to finish their meals	72.8	80,0	SATISFIED
18	The waitstaff listens to the patients' complaints regarding the food served	80.0	79.6	SATISFIED
19	The nutritionists are always punctual in providing nutrition services	78.3	81.3	SATISFIED
20	The waitstaff serves the food on time	79.1	85.1	SATISFIED
21	The nutritionists are skilled in explaining the food being served/provided	77.0	79.6	SATISFIED
22	The nutritionists adjust the food served to the patient's eating habits	71.9	80.9	SATISFIED
23	The nutritionists inquire about the patient's eating habits	71.9	78.3	SATISFIED
24	The nutritionists ask for the patient's feedback on the menu served	77.4	83,0	SATISFIED
25	The waitstaff asks why the food served was not finished (if not consumed completely)	72.8	79.6	SATISFIED
	TOTAL	1917	2049	
	AVERAGE	76.7	82.0	SATISFIED

Based on the analysis of patient expectations of food presentation, all aspects studied were below 90%, with an average expectation of 76.7%. Likewise, in the reality of the sample, of the 25 factors examined, no element was above 90%, with an average of 82%.

Based on the level of patient satisfaction, it was found that patients were satisfied with serving food at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital. This is because the level of satisfaction is obtained by comparing the percentage of reality with the rate of sample expectations.

1) Cartesian Diagram Analysis
   To find out the priority scale of 25 aspects, a Cartesian diagram analysis was carried out. Based on the research results, four aspects are top priority (16%), nine aspects that must be maintained (36%), ten parts that are low priority (40%), and two aspects that are considered excessive (8%).d
   The results of the quadrant analyst distribution are as follows:

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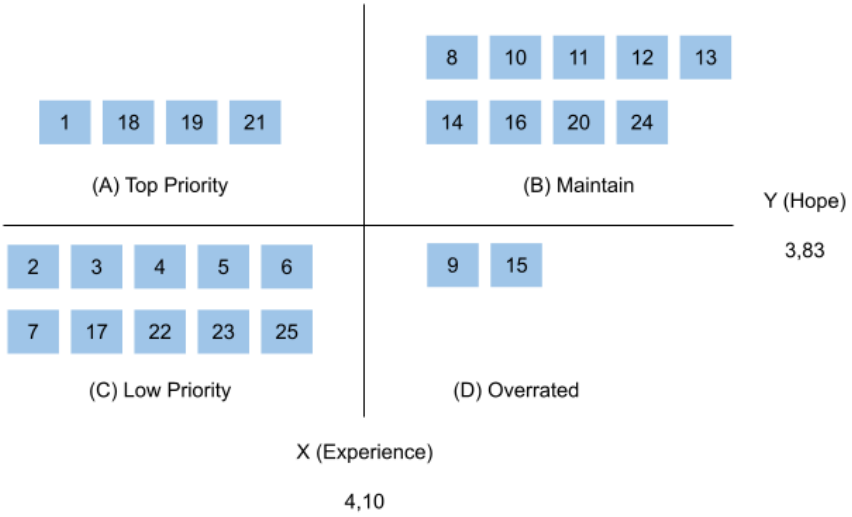

Figure 1. Cartesian Diagram of Satisfaction with Food Provision at Eri Soedewo Pavilion, Gatot Soebroto Army Hospital.

a. In quadrant A
Serving criteria are considered important by patients, and in reality, they are not by the wishes of patients but need to get the top priority to be improved, including the taste of the food served (1) Waiters listen to complaints about the food served, the timeliness of nutritionists in providing nutrition services and the skill of nutritionists in explaining the food did.
b. In quadrant B
Criteria for serving food that is considered important and, in reality, are above average or expected include the cleanliness of the equipment, the appearance of the waiter and the formation of the nutritionist, the friendliness of the waiter and nutritionist, namely applying smiles, greetings, greetings, servers knock on the door, say greetings and confirm the patient's identity before serving food, nutritionists introduce themselves before providing nutrition services, timeliness of serving food on the number, and nutritionists ask the patient's response to the menu served on the number.
c. In quadrant C
The criteria for serving food that is considered less important and whose performance is below average are the variety of food ingredients, food colour, aroma, texture, a portion of food, suitability of tools, nutritionists advise patients to finish the food, food is by eating habits, nutritionists ask about the patient's eating habits, and the attention of servers asks the reason why food is not spent.
d. In quadrant D
Criteria for serving food that is considered less important but the performance/reality is above average, namely the completeness of cutlery and waiters inviting patients to eat.

3.4 Discussion

The server's performance influences patient satisfaction because serving food in the hospital needs attention [18]. The level of happiness is a comparison between reality/performance and one's expectations [19]. If the reality/performance does not match one's expectations, then the level of satisfaction will be lower [20].

In this study, neither the percentage of expectations nor the reality of the sample of the 25 aspects studied was above 90% [21]. In the sample's expectations of food presentation, the average expectation was only 76.7%. The highest reality was in the aspect of servers and nutritionists applying smiles, greetings, and servers knocking on the door, saying greetings and confirming the patient's identity. In reality, the sample average was 82%. At the same time, the lowest reality score was on food aroma [22]. Based on the above results, it is found that the performance of food serving has not met the minimum standard set at 90%. However, suppose the real results are compared with patient expectations. In that case, the result is that the patient is satisfied with the service provided.

Based on the results of the analysis of the characteristics of the sample, it is known that all representatives at productive age, namely 18-49 years, stated that patients were satisfied with the food served, and at the age of 50-80 years some samples indicated that they were not happy with the food. This agrees with Sangadi and Sopiah who say that age is a one-factor affecting patient satisfaction. At an advanced age, a person's view of manners and culture is stronger, so patient expectations are higher, especially in officer performance.

Based on the analysis of the research results, there is a tendency for samples with a high level of education to have a low level of satisfaction. According to Stefan's research, the higher a person's education, the greater their desires and expectations, including health services. A high level of education will cause low satisfaction, so high-quality services are needed to get pleasure. This is also reflected in this study. In most samples with a high level of education, expectations for food served at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital are high, so the level of satisfaction is lower than in samples with low or middle education levels.

Based on the sample characteristics based on the treatment class, the class I and II samples tended to be satisfied with the food presentation at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, while the class III tended to be less comfortable. This is because food production at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, is differentiated based on the type of care, where class I and II patients use ceramic cutlery while class III patients use Tupperware. However, in the sample characteristics based on gender, occupation and type of disease in this study, there was no influence on the level of patient satisfaction with food presentation.

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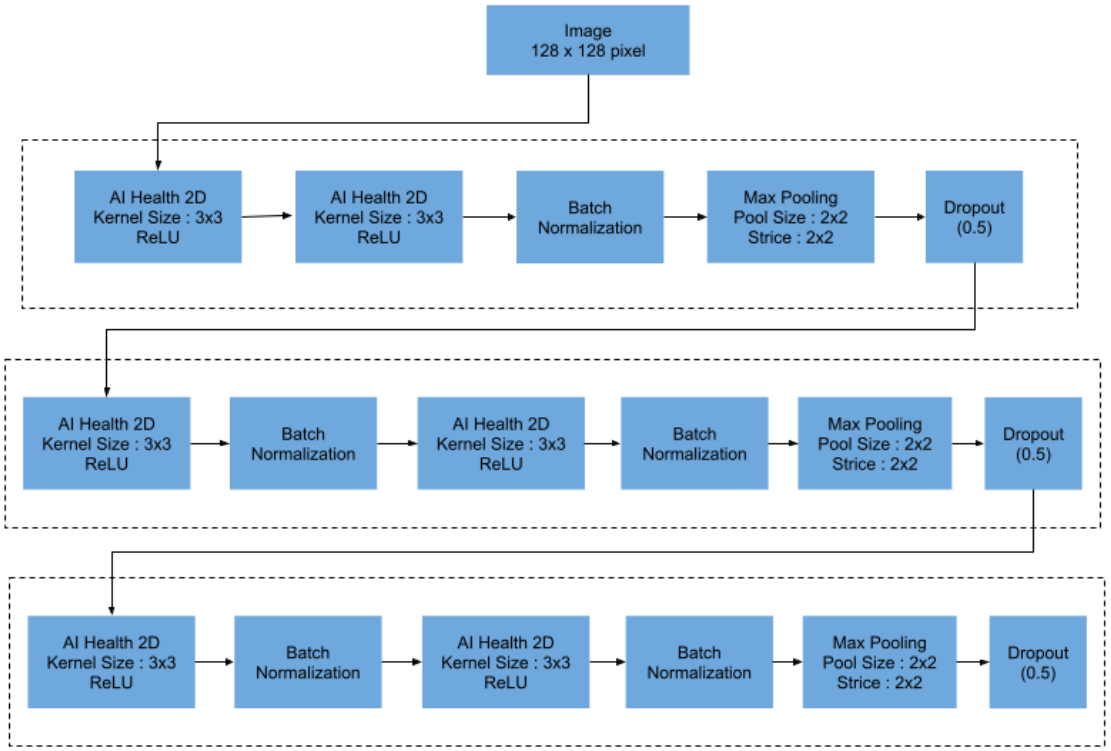

Figure 2. Framework AI Health

AI can be used to analyze the information collected about these factors [23]. Patient data can be further examined using AI technology to find patterns and relationships between these factors and patient satisfaction with food presentation [24]. For example, AI can explore the impact of treatment classes on patients' perception of food presentation or identify food preferences based on patients' age and socio-cultural background [25]. Hospitals can improve food presentation by taking appropriate actions after having a deeper understanding of the factors that affect patient satisfaction [26]. AI can also help provide food recommendations that match preferences, strategize menu personalization and patient needs, and improve overall service quality [27].

4. Conclusion

Based on the results of research on the level of satisfaction of inpatients with the presentation of food at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, it can be concluded that the expectations of inpatients in the most answers are important answers as much as 65.4%. The lowest answer is 1.4% less important. And in reality, the highest response was a good performance of 68.7%, and the vaguest answer was a poor performance of 0.3%. The level of patient satisfaction with the food presentation at the Eri Soedewo Pavilion, Gatot Soebroto Army Hospital, shows that the percentage of reality is more, with an average of 82.0%. In comparison, the rate of patient expectations averages 76.7%. Based on the above results, it is found that the performance of food serving has yet to meet the minimum standard set at 90%. However, the real results are compared with patient expectations. In that case, the result is that patients are satisfied with the services provided. AI analyzed the factors and patient satisfaction with food serving. AI examines the impact of treatment class and food preferences and improves the quality of hospital services. To the food organizers, especially the processors in the Nutrition Installation, it is recommended to hold cooking courses or training so that the performance

and quality of the food served are by patient expectations. For servers and nutritionists, it is recommended to have task orientation, exercise or nutrition seminars to improve performance and skills in providing services to patients. And the hospital can use AI to offer food recommendations according to patient preferences and feedback.

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